

## AMATEUR PHOTOGRAPHY IN ITS EDUCATIONAL RELATIONS.

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[A lecture delivered before the FRANKLIN INSTITUTE, February 11, 1889.]

The Lecturer was introduced by the Secretary of the INSTITUTE, and spoke as follows:

MEMBERS OF THE INSTITUTE, LADIES AND GENTLEMEN:

The subject as announced for the lecture this evening is Amateur Photography. Now, whilst many photographic societies experience great difficulty in defining satisfactorily the term Amateur Photographer, I apprehend that we will have little difficulty in agreeing in regard to the term Amateur Photography, and I desire at the outset that there may be no misunderstanding about it. The first mentioned difficulty originates in the two-fold character, possessed by many who practice photography. They have an amateur and a professional side, and frequently in the professional the amateur side is so unduly developed that the professional is almost lost sight of, whilst, on the other hand, in some amateurs the development of professional traits is only restrained by the quality of their work. By amateur photography then this evening we mean amateur practice, whether by professional or non-professional.

In determining upon the treatment of the subject I have been influenced by a knowledge of the fact that this INSTITUTE is deeply interested in the encouragement of popular scientific education, and healthy public sentiment upon this point, as well as in higher scientific investigation. A few years ago, in the course of lectures at the International Electrical Exhibition, under your auspices, I had the pleasure, in a lecture on Actinism, to illustrate the scientific basis of photographic practice, and to call attention to some of the most recent advances, of which orthochromatic photography was



then, perhaps, the most recent, for the further development of which this INSTITUTE has done so much through the contributions of Mr. Ives. This evening I propose to call attention to and emphasize as best I can some of the more purely educational features of photographic practice, the resources of which in this respect have more particularly impressed me in connection with instruction for many years of classes in a course of so-called liberal education, I mean an ordinary college course, as distinguished from a technical course. I cannot but recognize, too, as a fact that amateur photography has perhaps reached its highest development in this city, and that its societies here are not only of the oldest, but among the most active and progressive, and that consequently it would hardly repay to consume time in demonstrating well-known processes. Any purely practical suggestions therefore, as to formulæ, wrinkles and dodges, will be purely incidental.

Amateur photography is sometimes called, and perhaps oftener looked upon, as a popular craze, as the fashionable amusement or pastime, as something that will have its day and in turn be supplanted in popular favor. The advertising columns of periodicals of current literature would tend to confirm such an impression. This treatment of amateur photography as a popular craze has a tendency to depress its practice to a lower level, and to check temporarily its inevitable permanent growth. But a closer consideration of this pastime, of its nature, its relation to permanent desiderata—not of a strictly commercial or technical character—will discover elements of permanence that distinguish it from the thousand and one other ephemeral minor arts that appear upon the surface of society for awhile and then lapse into merited or unmerited desuetude. As one who has employed photography, not only for recreation and entertainment, but for the higher uses of which it is susceptible, for research and as an educational means, I feel that in this place it will be proper and perhaps profitable so to discuss the subject that all who claim a high ideal for the art science may be strengthened in their advocacy and practice.



Now, nothing perhaps will show more clearly the permanent character of amateur photography than a brief glance at its history among us. There is something in it that stamps it as essentially different from the other arts alluded to. As an amateur of thirty years' experience, as a constant reader of its literature, as one enjoying each advance, each new application, and the rapid growth of photography as an amateur art, I see no backward step, no halt, no diminution of numbers or of devotion, but a steady forward movement along all lines, sometimes rapid, at other times slow, but always an advance. But the amateur of thirty years ago required many virtues in a high degree now scarcely known. At this point I miss much the inspiration as well as the moral support of the expected presence of your honored president, unavoidably absent to-night, to whom I could appeal to substantiate much that I may say. To him I owe my trend, or inspiration, if you please, in this direction. He had experimented with a process nearly related to one that to-day produces perhaps more square yards or miles of photographic prints, than all others together. I well remember the pleasure and surprise occasioned by the exhibition of a few of his early blue prints of ferns, accompanied by the statement that they were photographs, and after the statement of the simple process by which they were produced I was fixed as an amateur photographer. Everything at all available was soon printed in blue—leaves, ferns, laces, MSS., even old ambrotypes, scraped clean of their black varnish. The process, I said, was nearly related to the present blue process, but, like all other processes of that day, it was slow, exceedingly slow by comparison. The preparation of the paper consisted in simply brushing over it, lightly, back and forth, with a tuft of cotton, a solution of ferricyanide of potassium of a strength of about 100 grains to the ounce of water, the paper being pinned to a board at the corners. That paper can be exposed for hours, or even days, without danger of overprinting. It was so slow that many lost faith in it. After I had published the formula, more than twenty years ago, in *Leaf-Prints or Photography without a Camera*, with a



recommendation of it to beginners on account of its simplicity, I received many inquiries and complaints from all directions, and among them one through the publishers from Constant Guillou, whom all older amateurs will remember, and whom I remember well by his exquisite Cuban views received from him as a member of the first Amateur Photographic Exchange Club. His opinion in regard to the process was very pronounced, whether he named it a mistake or a fraud, I do not recollect. I can only account for the roundabout way in which his opinion reached me, by a failure on his part to recognize on the title page the name of one of his photographic correspondents. There was one effective answer to all these communications—a print produced by the process, and advice to give them time enough. The process is not without its good points. Some of the failures with it were due to want of discrimination on the part of the druggist, to whom early amateurs were most likely to go, between ferricyanide and ferrocyanide of potassium.

But it was not in the nature of things that one should remain contentedly simply a photographic printer, if there was even a remote possibility that images in the camera could be produced. To be sure, photographic cameras were not temptingly displayed much in the windows or pictured in advertisements. They were at best rather crude and decidedly expensive. But here again, my friend, your president, moved a little in advance. He made his camera, furnished with a spectacle lens. It was primitive enough, but it had one great virtue—it was at least light-tight. As to the negative process employed, it was one that I would hesitate to attack to-day with certainty of success. It was dry, of course, and was called Whipple's Albumen Process, a French process, improved by the addition of honey or syrup to the albumen, the vehicle of the alkaline bromide converted into sensitive silver bromide in the nitrate of silver bath. After sensitizing, the plates were washed and dried. Many things were learned, not strictly photographic. We learned to break eggs with a smart tap, so as not to affect the yolks, to hook out the germs with a toothpick, beat them to a perfect



froth without a patent egg-beater. We studied well the interminable list of "don'ts" and "take cares," acquired a proper dread of dust, which we were told was the greatest enemy of successful photography. We followed the book in all its multitudinous and minute details, in the cleaning of the plates, the levelling, the coating, the washing, the drying, and the storing of the finished plates—for we were groping around in an unknown field in helpless and almost hopeless darkness, and we held on to the leading-strings. But the book by Geo. W. Coale, though quite small and unpretentious, was a full one, carefully prepared, embodying much experience. There was not much left to be read between the lines. I cannot now ascribe a single failure to misdirection or want of direction. Of course, there was always room enough for thought on our part, but the whole character of the book is in marked contrast with the most of the photographic literature placed in the hands of the tyro of to-day with his outfit. To be sure, such a book was more necessary then than now. The discouraged tyro to-day can drop in on his older brother, entertain him with his little troubles, and receive advice and comfort; or, if they are too big for that, he can take them to the society at its next meeting. We had a society, with an excellent constitution, elaborately engrossed, and its initials, "P. P. S.," are on many unique prints, but it was not of much help to us, as we were the only members, and the constitution never could be put fully into effect for want of members to fill the offices. There were a few other amateurs, but we never discovered them, nor they us.

But to return to the Whipple process; when everything was ready, the book said, "to prepare six good plates is an hour's work," and that they would "be good for at least one month if kept absolutely free from light, moisture or deleterious atmosphere," under the latter cautioning against the neighborhood of fresh paint, varnish or ammonia. It closed that chapter with the caution that the amateur should not be "disheartened by repeated failures to get good plates," "that the difficulties were only to be overcome by sheer perseverance, with the exercise of patience and judgment," and the comforting assurance that "when success was attained



the exercise of the skill required would impart to it an attraction which the more mechanical and *infallible* methods lack," and the "infallible" was emphasized by the author. What an inspiration to patient, painstaking, thoughtful work to a boy of brains and character; what an encouragement to perseverance under difficulties! What an educational influence in this, compared with the inducements held out for the practice of photography and too much of its literature of to-day! It says, too often, "You need not know anything about anything; you need not use your brains—in fact, you needn't have any; as to skill, in fact, there is not as much needed at any stage as to turn a barrel-organ, and withal very little outlay; it is only necessary to touch a spring, or turn a crank, and the whole pictorial world is yours." After the Whipple process plates were prepared, how precious they were! They represented a great deal—not, perhaps, of money, but of what was more than money—and you may infer that the views for them were selected and studied with great care. There was not much firing at random with these plates. A little incident will illustrate their slowness. On one occasion, standing with head uncovered, the hat being used to shield the lens, we had twenty minutes to employ in speculating upon the future of photography, and fixed the ideal, unattainable limits of sensitiveness as that which would permit the simple uncovering and covering of the lens, rather leisurely at that, and yet have the picture fully impressed. We never reached the snap-shutter stage, even in imagination. But what a state of mental tension, of suppressed expectation, the development of those plates involved, as the solution—not solution "A," nor solution "B," nor a mixture of them, nor somebody's infallible ready-mixed developer—was poured over them, not in the tray of the outfit, but in the home-made tray. That developer was carefully compounded, every ingredient carefully weighed, or measured, and recognized and remembered as a friendly factor in the case. Then the injunction was to watch the plate attentively during development, to inspect its progress from minute to minute, just as with your modern plates; exactly why, how-



ever, never was very apparent, as half an hour's soaking, with all the watching, never over-developed them; but if in that time it did reveal the unmistakable outlines of a white-washed fence, or a barn, it afforded the gratification of the confirmation of our faith in the process, a realization of the fact that a spectacle-lens image could impress itself even on our plates. Although I never reached with this process that happy stage incident to a clean, well-developed negative, which our author told us was in itself a beautiful object, still the negatives, such as they were, were regarded with an affection that was not lessened by the unappreciative criticisms of our friends, who might say: "Yes, there is the fence, there is the barn, but why does it look like the deluge or midnight?" But there was more than photographic success in all this; there was that discipline that led us to venture on the apparently more mysterious and seemingly more difficult collodion process. The results of the first attempt with it were so quick, so satisfactory, so certain, by comparison, that its trial at once marked a new departure, from the dry to the wet process, which created new necessities. It required a portable laboratory, portable tent, portable silver bath, trays, bottles, etc., etc., and ingenuity was taxed to its utmost to minimize the impedimenta and to store them so as to reduce the time required for setting up and striking the tent.

This tent is only exhibited to emphasize that period of landscape photography, entirely with the past, when humidus had the field to himself. Besides the cumbersome of the apparatus, there were the most vexatious annoyances, caused by the photographic reagents, and especially by the unreliability of the sensitizing bath, upon which the responsibility for most of the troubles was placed, and perhaps justly at mid-summer temperatures. The literature of the nitrate of silver bath, read with avidity by amateurs of the past, would itself fill volumes in which the dry-plate amateur has comparatively little interest. The spectacular feature of the tent was not without its annoyance. A bag of yellow and black muslin, enclosing the head and body, with the lower extremities still well dis-



played below, was calculated to excite unappreciated comment, and always occasioned an unpleasant realization to the one within that the small boy might be tempted to do more. There was a dry process, however, that soon sprang up that disputed the field, and one that, although not suited to compete with the gelatine plates in rapidity, has many points to recommend it, especially for stereoscopic transparencies, as it is simple, certain and beautiful in its results and inexpensive, and would almost justify the amateur in adding the collodion bottle and silver bath to his outfit. I allude to the Tannin Process. The well-cleaned plates are coated with any good commercial bromo-iodized collodion, sensitized for five minutes in a nitrate of silver bath of forty-five grains to the ounce of water, saturated, of course, with iodide of silver, then *thoroughly* washed in water, then flowed with a filtered solution of tannin of fifteen grains to the ounce of water, and then dried. The washing is the most troublesome part of the process. It can be reduced by washing the plate in several changes of water, and then flowing it with a five per cent. solution of iodide of potassium, and then rinsing. My own practice, published a few years ago, was to prepare the plates up to this stage\* in the broad daylight, and allow them to dry, as iodide of silver formed in presence of iodide of potassium is insensitive, and that formed in the film in the nitrate bath is rendered insensitive by the flowing with iodide of potassium. These plates can be sensitized at any time by immersion in or flowing with a solution of tannin. The development with pyrogalllic acid, and nitrate of silver, restrained by citric acid, is simple and controllable, and the light permitted comfortable, whilst the finished negatives, or transparencies, have a rich brown tone, leaving nothing to be desired. The plates will remain sensitive for, at least, two years.

Now this retrospect as a scrap of history has little value, but the points touched on will emphasize the characteristics of early amateur photography. Those were its heroic days

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\* *American Jour. Sci.*, July, 1874.



There was much hard work, and there were few tangible results. If we worked for pictures, we were poorly repaid in numbers or quality, but we worked rather for light, for improvement of processes, for the detection of the subtle conditions of our oft recurring failures, and we had to find our highest reward in that exquisite pleasure of success wrung from unfriendly conditions. If our pictures were not good in every respect, we felt that we had done all to merit that highest excellence of any scientific work, the highest excellence attainable by the processes and apparatus at our command. And as we look back over those years, and note now how many have continued, or have resumed at intervals, the practice, as well as the fresh additions of thoughtful, careful, enthusiastic amateurs, can we not infer that thirty years after this the camera will still be even more the *vade mecum* of many, in years of greater leisure, and that amateur photography is not simply a popular craze? The efforts of the trade to push the practice of amateur photography by any mode of presentation that may be most effective, and in any place that may be open, even by representations that are almost sure to disappoint, or that may seem to belittle the practice, may be perfectly legitimate from a business point of view, and in the end may do no harm. The boy who is inveigled into buying a Kodak, or who has a father, or a friend, that would make him so suggestive a Christmas gift, may soon find that there is something beyond the Kodak, and develop into a high-class amateur. If there are others with whom the seed may fall in shallow soil, and whose Kodaks may soon find their way to their several garrets, or to the second-hand store, this circumstance can hardly be considered an argument against the Kodak. But in this Augustan age of photography, with its perfected technique, with plates and processes and apparatus that leave scarcely any quality to be desired, for any purpose, at the command of all, is there nothing left to require and develop the highest qualities in its devotee? Certainly there is as much in it as at any time. The ground has simply changed. There are broader applications to be made, there are more subtle conditions to be



considered, there are higher excellences than those of merely technical success, there are demands for work of higher merit than that embodied in mere sharpness of definition or gradation in development. The high lights may have been allowed to take care of themselves, and the details in the shadows may have been taken care of in the development, as is so often suggested, but the result may be all the more a discredit, because of the absence of thought, of taste, or of judgment, which it discloses, and which the perfected technique, and easy methods render unpardonable as well as conspicuous. As some one has said, advances in photography have made it easy for any one to take poor pictures, but the same standard of excellence remains to-day as thirty years ago, the highest work in all respects attainable. Success does not consist in the number of shots that can be made on an excursion, but in what there is in the results to give them any value. The cheapness of plates and the ease of exposures are not promotive of the highest class of practice. A restraint should be put upon the enthusiastic sort of drag-net tendency to take everything, and trust that something will prove desirable.

But, unquestionably, the great and most natural desideratum with most who enter upon amateur practice is the rapid acquisition of that technical knowledge and skill that may render possible satisfactory results. They may be willing to put all the thought, and care, and trouble into it, but they do desire tangible returns. In a large city, and a city in which amateur photography has, perhaps, reached its highest development, few can fully realize the discouragement under which the more rural amateur works, who can only eke out his experience from the journals. A few years ago the thought occurred to me that a summer school of amateur photography, at some quiet place of resort, might meet a felt want of some. It was discussed, perhaps somewhat enthusiastically, in the hearing of a gentleman, who pigeon-holed it away, and, after a few months, I received a pressing request to organize and conduct such a school for two weeks, with conditions annexed that seemed to render success possible. I elabo-



rated a plan with considerable care, and prepared for its execution on a generous scale, and acquired considerable experience that may be of value to anyone attempting a similar enterprise. The resort was a new one, on the top of the Alleghenies, a hundred cottages and a few small hotels held the whole population. I had never seen the place, but I shipped in advance a whole car-load of apparatus, comprising a full assortment of cameras and everything that would illustrate photographic practice, and, in addition, permit half dozen popular lectures on cognate subjects. The school was well advertised, the terms were very moderate. I reached the place a few days before, only to find that not a student had been enrolled, and that no preparations had been made for it. The school of photography could not be found with a microscope. The officers of the settlement, apparently regarding the enterprise as a failure, were not to be found; not a ticket had been disposed of for the course of popular lectures, upon which they had placed their main reliance. All the same, the car-load of twenty-two boxes was taken to an unoccupied store-room, that leaked light at many crevices, but which was roomy, and the shelves and counters of which promised to be useful. Withal, there seemed to be but one chance remaining for a semblance even of success, and that lay in the possibility of presenting the practice of photography in such a way that some might consider it favorably, at least in its simpler applications. Finding the man in charge of the grounds, I advised him to have some dodgers struck off and distributed, inviting to a free lecture on photography, the evening before the appointed opening of the school. There were many ludicrous incidents connected with the whole affair up to this point, and not the least these dodgers, in their composition and mechanical execution. But perhaps 200 auditors were on hand, about the whole available population of the place. Discarding all thought of a popular scientific introductory, I began with photography, presented the leading features of its practice, dwelt upon the simpler processes in detail, exhibited a lot of blue prints, gave an opportunity to parties desiring



further information to ask questions, and invited any desiring to enter to present themselves next morning at the room. And the school was a remarkable success. Twenty-five presented themselves on time, and the number soon increased to thirty, when no further encouragement was given to enter, and unless I had been fortunate in having with me one of those unduly developed amateur professionals I would have been unable to organize and carry on the school in the absence of many of the conveniences that we are apt to consider indispensable until we are obliged to do without them. But in that excellent mountain atmosphere, often up at six in the morning, and as often not in bed before twelve at night, we ran that school for two weeks, or, rather, it ran us.

There was enthusiastic, earnest, thoughtful, continuous work, acquiescence in inevitable inconveniences and discomforts, and gratifying progress. The ages ranged from over sixty to a dozen years, all equally enthusiastic. It was not a craze. The apparatus provided for illustration and display, as far as applicable to amateur wants, was laid hold of. Fifteen complete outfits were disposed of, and others subsequently ordered, and occasionally yet a package of prints reaches me, which tells of continued interest in the practice. If you were to ask me, to what I attribute the success, under the unpromising conditions, I would answer, to the plan of the school; and there may be in it a hint for dealers, as well as for any who might wish to conduct a similar enterprise. The exercises were arranged on a progressive plan. There were four distinct courses from which to select, but as each higher course included the privilege of the lower courses, all were put upon the first course, whatever their selection. In other words, something was given the students to do, at the start, that they could reasonably be expected to do. They were tempted only to undertake what was practically certain of success, what was entirely within their range, and then they were allowed to do it, thinking and all, with the least amount of direction and supervision consistent with the proper use of their time. In other words, they were not overinstructed. Now,



there is nothing like success, and especially independent success, to whet the appetite for more and higher practice, as well as to inspire that measure, and kind of confidence so necessary in many cases. Blue printing, the first course, was therefore given a prominent place in the announcement. Most effort was expended in displaying fully its applications and possibilities. Prints of every variety were conspicuously exhibited, from large architectural plans to the humblest leaf prints. Cards, with prints from negatives, of a great variety of subjects, including series of scientific subjects, copies of engravings, landscapes, etc., were hung up, not only for inspection, but to facilitate the selection of negatives for practice by the students. No one can fully realize the attractiveness of this simplest of all photographic processes and the resources it furnishes for photographic instruction, until he has seen it properly presented to an assemblage of two dozen individuals of average intelligence, affected with the ennui of the average summer resort. It can be made introductory to all the elementary principles of photography, to the characteristics of negatives, to printing manipulations and to the acquisition of that photographic sense upon which subsequent processes may be based. The majority enrolled for this course, most without the remotest intention of going further, but after the use of negatives the desire to produce them was most natural, and the second course of wet-plate camera practice was soon entered upon with even more enthusiasm by most of them. I had anticipated a run upon this most fascinating of all photographic processes to the beginner, and was prepared with a supply of negative baths and wet-plate cameras. Silver printing was touched upon lightly. Platinum printing was regarded with more favor, as it is the process for the amateur, next, perhaps, to bromide paper, which at that time was not in the market.

After these courses, dry-plate photography almost took care of itself. All instruction in the use of the camera, focussing, selection of view, etc., had been already given, and that without the inevitable waste of time by the tyro with a dry-plate outfit running around to hunt up something



to take, and which he seldom gets, because he does not know a good negative when he sees it. A school of photography must rest upon a correct pedagogic basis, or it may be so only in name, and fail to accomplish what can be done by it. So, too, in the skilfully prepared advertisements of dry-plate outfits, accompanied by pictures of cameras pointed at running dogs or jumping horses, there is great risk of such disappointment of legitimate expectations, and consequent discouragement, that the camera it sells may soon go to the garret. Parties frequently select their subjects in advance of purchase, and even promise pictures to all their friends, and it is not a small matter, as anyone knows who has experienced it, to explain the delay in delivery long after the camera has put in an appearance. I have in my pocket a letter just received from a bright little girl, asking advice in regard to an outfit suitable to take her little brother. I have no doubt she will succeed eventually, but I see between the purchase of the camera and the realization of her wish discouraging disappointments, which a girl of twelve may not survive photographically. I have written her frankly that it is not the camera that takes the picture, but the little girl behind it, and preparing her somewhat for her first disappointments, and assuring her that if she makes up her mind not to be discouraged, she will be able to get a picture of her little brother long before he becomes a man, which she may, after all, be inclined to doubt. The point at which photography is attacked has indeed much to do with the results, and the encouragement generally is to begin as far from the beginning as possible. If dealers were to put upon the market, with some display, complete outfits for blue printing, including the preparation of the paper, with suggestions of variety of work to be done, and include series of half dozen or more carefully selected negatives for practice, I am inclined to think the sale of negative outfits would be promoted, and a broader basis for persistent amateur practice be encouraged. Now, a word as to the literature of the school. In the earlier stages it consisted of brief, carefully prepared instructions upon the exercise in hand, first given orally, perhaps with



comment, and then posted in the room for reference, all supplemented by lecturettes of twenty minutes at the opening each morning, upon such topics as the practice for the day and the experience of the previous day suggested. Their own experience rapidly put flesh on these outlines, and especially with the encouragement in the use of the ever-present note-book and always-pointed pencil, which always accompany systematic and thoughtful work. At the close of the school they were not only prepared to use a photographic hand-book, but it had become a felt want. But I leave this subject of schools of amateur photography with the simple expression of the opinion, founded on facts continually forcing themselves on my attention, that there is a place for such schools; that there may not be much money in them, but that they would at least repay financially, and would furnish much pleasure to all parties.

But there is a more purely educational phase of this subject. Not many years ago text-book cram was considered a quite satisfactory method of instruction in science and if to it were added lectures with illustrative experiments, nothing more seemed necessary or possible. In recent years work by the student is recognized as having a value of its own, not only for the acquisition of fruitful knowledge, but of still more fruitful mental discipline, which latter many still contend is the chief end of a liberal education. Whilst it is not necessary to concede that that knowledge which may be useless is best adapted to mental discipline, it can with propriety be claimed that photographic practice, as part of a liberal education, must be judged by the same rule that applies to the other branches; that even if the camera be laid aside, never to be employed again, the discipline involved in practice with it would remain just as truly as that incident to the study of algebra or of trigonometry to say nothing of the calculus, never employed in after life, or of Latin and Greek, never read or spoken, or even of that practice of music, often so faithfully carried out in early life, only to be entirely laid aside later on. Now, in the early introduction of laboratory practice by the student, it seemed, in the nature of the case,



restricted to chemical work, and always attended with liability to run into mechanical methods, by reason of the general uniformity of the processes, as well as the similarity of the phenomena. Physical phenomena more varied in character, involving broader generalizations, and more numerous laws, capable of mathematical expression, and of ready verification were excluded by reason of the demand they seemed to make for apparatus, space, and time, and an apparent necessity for high mathematical attainments as a basis of their study. Now, recognizing the principle of the best attainable results with the apparatus employed, and realizing that it is not the extent of mathematical acquisitions, but rather the ability to apply that is called into requisition, and that the educational value of a physical laboratory may lie far below the line of the calculus, arithmetic, and elementary algebra, trigonometry and analytical geometry have new value and interest imparted to them. Photography presents many features that led me to adopt it as a laboratory exercise many years ago, and to retain it at present in the physical laboratory as a valuable educational means. It is recommended by the wide range and varied character of its operations, from the simple blue print to the highest scientific applications, as well as by the progressive character that may be given to its exercises. In common with many other minor arts, its results are things, not simply facts. They can speak for themselves, and are in the main permanent, can be referred to at any time, and are comparable with subsequent results. Attention can be called by the instructor to their different qualities at different times. It also recommends itself by the severe test it affords at every stage of patience, thoughtfulness, many-sided attention to minute details, promptness in judgment and promptness of response in manipulation, as well as of skill. The work of the tyro, to the experienced instructor, bears the easily recognized earmarks of neglect, or thoughtlessness, or ignorance, or want of skill at any stage. The learner soon discovers that nature recognizes no conditions as minor or trifling in photography.



It may be objected by some that photography is largely qualitative, but it might be reasonable to inquire, whether physical laboratory practice is not made to consist too exclusively of precise measurements. Work may require skill, closeness and precision of observation, and all the qualities developed in the highest degree by quantitative work, and yet not consist in fundamental measurements of lengths, and angles, and weights, and time. It may not seem to those, who merely read the advertisements, that photographic practice requires, and encourages careful, thoughtful, precise work and skill. But nothing is more deceptive. A few years ago a section of students starting in upon photography appointed a historian. He had a voluminous account, but much of what they had learned was condensed in the motto of the title page: "It looks easy—try it." Indeed, very little practice renders it a wonder that any perfect negative should run the gauntlet of all the possibilities of failure. The demands upon the average man, too, are rather qualitative than quantitative, for quickness in estimating when the measuring stick cannot be applied. The expert samples wheat without measuring the size of the grains to a fraction of a millimetre, or weighing, though both size and weight enter into his estimate. In same way the quality of fabrics, as well as wool, cotton, is estimated. Even the physician in his diagnosis is qualitative beyond the thermometer. With the expert photographer this unconscious judgment that decides a negative to be first-class, before he begins to tell you why, seems almost a matter of feeling. Quality in these cases is the sum of many conditions, and as far as they are quantitative, rapidly estimated, not measured. In an educational photographic course there is, however, some choice of processes. Much that I have said in regard to blue prints may apply here, but for varied and peculiar excellences in this respect, perhaps no process can be compared with the wet collodion process. If it did not exist, it would be advisable to invent it for instruction. It allows the use of comfortable and abundant light, something not to be overestimated in the early practice of photography. The picture lies upon



the surface and manifests its qualities rapidly. More processes come under the observation and control of the student, and yet it is more rapid, in that completed results are reached more quickly than with the dry plates. Many experiments thus can be made in a comparatively short time. It is inexpensive, so that there can be no restraint on investigation by any thought of expense. But, perhaps, its chief value lies in the concentration in the briefest interval of time, of all the operations mental and physical that contribute to a perfect result—manipulation, observation, judgment. As you pour the developer upon the exposed plate every fraction of a second may be critical, especially with some kinds of work, as lantern slides. Not only close, quick observation, but prompt decision as to the quality of the picture, and equally prompt response of the hand to the judgment formed, involving skill, are all required. There lie between the perfect result and the barely passable one very few seconds in development. I sometimes feel as if no photographic experience can be complete without familiarity with some such process as this.

We have spoken of failures by the tyro, but among them are many the tendency to which he will never outgrow, and which should therefore cause no discouragement. Anyone is liable to get two pictures on one plate. No registering device will insure against it. Even in giving a student instruction upon this point the first puzzling indications, on one of the plates under development, rapidly grew into two dogs in two wagons in inverted positions, the unexpected interest in the picture somehow confusing the record of exposures. An experienced amateur, a D. D., had just made a snap-shutter exposure on an interesting young party playing with bean-bags in the open air. The picture was full of graceful poses and bags in mid-air, and I playfully cautioned him not to get another picture on the plate. He drew out his record book and pencilled down the memorandum, with air of one who had had some experience in that line, but, I learned afterward that, on development, there appeared upon the plate, also, the horse and buggy of a friend, hastily taken, with that obliging spirit of all



amateurs, upon a sudden call. So in the development, a plate exposed on a large stone building exhibited the startling effect of faces peering out of many of the stones, of a group that had already pre-empted the plate. Instances of the kind are numerous in every ones later as well as earlier experience, sometimes provoking but always ludicrous. A question is often asked as to the desirability of the companionship of a camera on a trip to Europe. That depends greatly on whether the camera will become the master or can be kept the servant, whether the tendency to multiply exposures, where there is so much worth taking can be restrained within anything like reasonable limits. If so, it may be a very desirable adjunct. But if it is allowed to convert a trip into a picture-taking excursion, much of the real pleasure and profit of such a trip may be sacrificed, and the pictorial results will be a poor return. On the steamer employment with the camera might prove an effective prophylactic against seasickness, or, at least, as I have found it, a great relief from the ennui of the voyage, and productive of interesting souvenirs. There are those who hesitate to take a child of three or four years, who have little doubt about their being able to manage a camera. My own experience with both is the reverse. On several occasions I have had the three and a half year old child and the camera. The latter was shipped direct to the point in Switzerland—the Zermatt region—where views, not then in the market, were desired, and there all the time and attention required were devoted to it, and it was then shipped as directly back to port on its way to America, that it might not lead into temptation along the route of travel. But the child always made the whole trip and enriched it with views peculiar to young eyes. As to the size of outfit in any case, for beginners, I invariably advise, 4 x 5, unless there are peculiar reasons for a different size, or any inclination toward stereoscopic pictures, in which case I as uniformly encourage it, and advise the 8 x 5 outfit. Many monocular views in Europe and elsewhere have a very limited value compared with that of the stereoscopic combination. Thus my own glacier views reveal almost



nothing as single pictures or lantern slides, but as stereographs possess a high value.

Great discouragement in the practice of stereoscopic photography has doubtless resulted from the fact that for so many subjects glass stereographs are almost indispensable to produce the highest effect, and these have presented peculiar difficulties in their preparation in proper position and of proper size on the glass, but I would suggest that if the recently introduced transparent flexible films are adapted to stereography, the production of transparent stereographs would be so simplified as to bring them, as far as their preparation is concerned, in competition with paper. The two binocular pictures could be printed separately, and mounted between thin cards with openings cut in them of the proper size and at proper distance from centre to centre, as I have done with mica plates. They could readily be made to fold in the middle and be sent by mail. I will only add a word upon what might be called the amateur's developer, with hydroquinone. My first trial was with Balagny's formula, with stock solutions as follows: Sulphite of soda (cryst.) 25 grammes, water 100 cc.; carbonate of soda 50 grammes, water, 200 cc.; hydroquinone 2 grammes, alcohol 20 cc. The developer was mixed from these stock solutions in proportions given. Simple in preparation, requiring few ingredients, prompt and controllable in action, suitable for plates of all makes and bromide paper as well, remaining clear and retaining its developing qualities for a month at least, in spite of frequent use, and withal inexpensive, it seemed to possess every desirable quality. A second developer, made up from the same stock solutions a few weeks later, became dark and muddy in early stages of development with the first plate. As I have received similar complaints by others, I would simply say that by the substitution of freshly prepared solution of sulphite, for the old stock solution, this objectionable feature disappeared. Doubtless the formula just given may not be the best for all purposes, but is susceptible of ready modification, and with flexible films will reduce much the trouble and uncertainties of tourist photography.



